

1986

Potential reasons for publicly funded forestry research

Steven H. Bullard

Stephen F. Austin State University, Arthur Temple College of Forestry and Agriculture, bullardsh@sfasu.edu

Follow this and additional works at: <http://scholarworks.sfasu.edu/forestry>



Part of the [Forest Sciences Commons](#)

Tell us how this article helped you.

Recommended Citation

Bullard, Steven H., "Potential reasons for publicly funded forestry research" (1986). *Faculty Publications*. Paper 148.
<http://scholarworks.sfasu.edu/forestry/148>

This Article is brought to you for free and open access by the Forestry at SFA ScholarWorks. It has been accepted for inclusion in Faculty Publications by an authorized administrator of SFA ScholarWorks. For more information, please contact cdsscholarworks@sfasu.edu.

Potential Reasons for Publicly Funded Forestry Research as Reflected in the U.S.A. Experience

STEVEN H. BULLARD

Forestry Department, Mississippi State University, Mississippi State, MS 39762 (U.S.A.)

(Accepted 19 February 1986)

ABSTRACT

Bullard, S.H., 1986. Potential reasons for publicly funded forestry research as reflected in the U.S.A. experience. *For. Ecol. Manage.*, 17: 53-59.

The general rationale for public support of research and specific reasons for support of particular research areas are of potential concern to many people. Those directly concerned with research funding and its rationale, for example, range from legislators to research administrators, scientists and graduate students. Public support of specific research areas is often defended for socio-political and economic reasons. As an example, although private-sector research in forestry is conducted by large, diversified firms, the benefits of even highly applied research can be difficult to capture. Public support is necessary in such cases, since social benefits exceed the benefits considered in private-sector funding. These and other reasons for publicly funded research are reviewed and applied to forestry and forest products.

INTRODUCTION

Research and development is performed by almost every segment of the public and private sectors of developed countries. In the U.S., for example, strong national commitment to research is evident in total funding. In 1981, total national expenditures for all research and development activities were estimated as \$69 100 million, of which 47% was publicly funded (National Science Foundation, 1981). The U.S. lumber, wood products and furniture industries spent about \$167 million on research and development in 1981 (National Science Foundation, 1983), or about one-fourth of 1% of the total bill.

The ratio of public to private research funding is higher for forestry than for many other fields. Forest-related industries rank among the lowest major industries in expenditure for research and development when such funds are expressed as a percentage of the value of sales (Tombaugh, 1981; U.S. Forest Service, 1981). Understanding the rationale for public funding is very impor-

Manuscript 6086 of the Mississippi Agricultural and Forestry Experiment Station

tant in defending the relative level of support for forestry research. This paper examines some economic and socio-political reasons for public sponsorship of research and relates them to broad areas of forest products, forest ecology and management. Examples are largely based on research in the U.S., but the rationale and discussion apply to many countries concerned with forestry research.

POTENTIAL REASONS FOR PUBLICLY FUNDED RESEARCH IN THE U.S.

Most publicly funded research in the U.S. is performed by the Federal government, State experiment stations, universities and colleges, and federally funded research and development centers administered by universities, colleges and businesses. The Federal government provides the greatest share of public research funds, primarily allocated to national security, space, health, energy, natural resources and the environment, education, and agriculture.

One guideline often used to determine if public funding is appropriate is whether research is basic or applied. Recent efforts to more closely delineate the responsibilities of government and the private sector have resulted in increased shares for basic research. For example, from fiscal years 1982-1985 basic research in the U.S. rose from being the smallest fraction (27%) of non-defense research and development in the Federal budget to being the largest (38%). Development funding dropped from 42 to 27% (Keyworth, 1984). Over half of Federal nondefense research dollars in the U.S., however, are currently allocated to applied research and development. These and other public funds are often justified for socio-political and/or economic reasons.

Potential reasons for publicly funded research are briefly reviewed in the following paragraphs and are summarized in Fig. 1. The reasons explain why basic research is usually provided by the public sector, as well as why some applied research and development is publicly funded. The reasons apply to basic and applied research in national security, health, space, etc., as well as to research in agriculture, forestry and all of the many other areas where public research support is important. They are potential reasons since all of them may not apply in justifying public funding for any one research area or project.

Socio-political reasons

Research can be used to promote public policy. Figure 1 indicates the inter-related nature of broad social goals and the distribution of research benefits and costs. Social equity goals and long-term economic growth and productivity can be enhanced by research. The distribution of expected research benefits and costs geographically and/or among income groups can potentially justify public support for research which might otherwise not be funded. Other often-cited socio-political reasons are that research adds to the general body of sci-

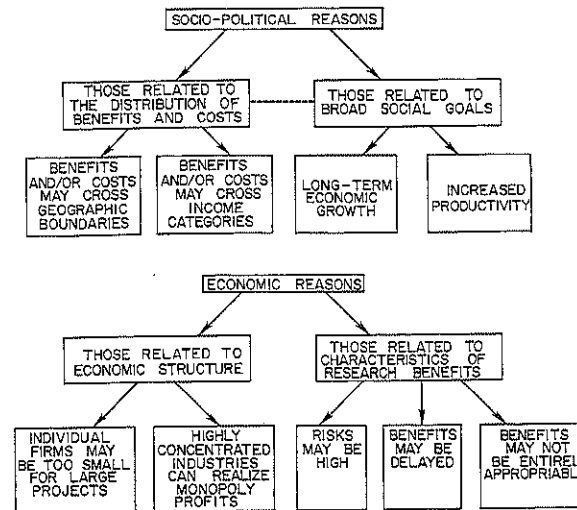


Fig. 1. Potential reasons for publicly funded research in the U.S.

entific knowledge, and benefits future generations, natural resources and amenity values (U.S. Forest Service, 1981). Such broad goals as national security, health, energy, and even the supply of wildlife and forest recreation can thus be enhanced by publicly funded research. In many cases, however, public support is more clearly justified for economic reasons.

Economic reasons

One broad class of economic reasons for public research support involves economic structure (Fig. 1): the sizes of firms and the proportion of total output which they produce. In industries characterized by many relatively small firms, the magnitude of research investments can be limiting, as single firms may be unable to finance major projects. On the other hand, in highly concentrated industries, innovative research may result in monopoly profits if funded by private sources (Purcell, 1981). Knowledge produced with public support, however, is available to all consumers and producers in an economy, resulting in greater efficiency in the use and distribution of research benefits.

The other class of economic reasons for public research support relates to characteristics of research benefits: they may be uncertain, delayed, or inappropriable. High risk levels, especially those associated with basic research, can reduce private incentives to invest. Uncertainty arises from the inability to predict which research projects will be successful and how the benefits will be distributed over time (White et al., 1980). The length of time before results

are obtained can also be a factor in research funding. Economic planning horizons of private firms may be too short to recognize expected future benefits (Runge, 1983).

One of the most significant economic justifications for public funding, however, is that for many types of research the results are not entirely appropriable, i.e., individual firms cannot entirely capture all of the benefits. Research providing such benefits as improved scenic, air, or water quality, or new knowledge in general, cannot be packaged and sold in market economies. For some basic and applied research, therefore, private rates of return are lower than social rates of return. In a market economy, research in such areas will be less than socially optimal without public investment.

PUBLICLY FUNDED FORESTRY RESEARCH

Which of the above reasons are most significant in the funding sources of forestry research in the U.S.? Socio-political reasons for publicly supported forestry research in the U.S. include increasing productivity, and reducing inflation and dependence on imports (U.S. Forest Service 1981). Publicly funded forestry research has also been proposed as an effective means of increasing timber supplies through better utilization. The McSweeney-McNary Act of 1928, for example, provided for a broad program of forest research, including research by the U.S. Forest Service, and was in part based on a desire to "insure adequate supplies of timber and other forest products" (45 Stat. 699; 16 U.S.C. 581). Planning for the future is important for U.S. consumers of forest products, but is also important for the 1.8 million people employed in the lumber and wood products, pulp, paper and allied products, and furniture and fixtures industries. Another major commitment to forestry research was provided in the McIntire-Stennis Act of 1962 (76 Stat. 806; 16 U.S.C. 582). This act provides public support for forestry research that is in part defended by recognizing "that forestry schools are especially vital in the training of research workers". Training future scientists through publicly funded research has thus been advanced as a potential reason for subsidizing such efforts in forestry.

Economics can also help explain why forestry research depends heavily on public support. Regarding economic structure (Fig. 1), private-sector research is limited in some regions because of the size of forest products firms. In Missouri, for example, most forest products industries are too small to support their own research organizations, and depend largely on research provided by public agencies (Duncan, 1979).

Private-sector forestry research in the U.S. is primarily funded by large, diversified forest products firms. Some arguments for and against greater research funding by these types of firms were presented by Wilson (1971). Greater research funding by large diversified companies is encouraged since

they may be able to wait longer for research benefits and they are better able to finance large projects. Large companies can also sponsor several research projects, needing only a reasonable probability that some of them will be successful. Since larger firms can wait longer for benefits and are less influenced by uncertainty, perhaps the single greatest explanation for lower research funding levels by U.S. forestry firms is appropriability of results.

U.S. forest products industries obviously cannot entirely capture the benefits from research on wildlife, forest recreation, watershed management, etc. For this reason, research priorities of the industrial sector focus on the forest as a producer of wood and fiber for consumer goods, while the entire population of research users in the U.S. favors research dealing with a much broader range of private and social goods (De Steiguer and Massey, 1981). Research in such areas may therefore warrant public support if social returns are acceptable, or if socio-political factors are involved.

Research on the production of wood and fiber was given high priority by U.S. forest industries (De Steiguer and Massey, 1981), yet public funding is significant. In silviculture and forest management, for example, innovations can be highly applied yet it may be difficult for firms to capture all of the benefits. Even in cases where benefits can be captured through patents, licenses are more difficult to obtain for biological than for chemical or mechanical innovations (Rausser et al., 1981). Companies therefore fund greater proportions of research in timber harvesting, transportation, and product manufacture and marketing. Public agencies such as the Forest Products Laboratory also perform research in these areas, yet must increasingly focus on basic research with potential application, and on very specific areas of applied research (Youngs, 1983).

Cooperative ventures between U.S. industry and State and Federal agencies have also been successful in forestry. Cooperative research in areas such as forest genetics and growth and yield has obvious appeal since needs are specific yet common to many firms, sole responsibility for extensive costs is avoided, and benefits are realized by all. The public-sector role in such programs can still be important, however, since antitrust laws may otherwise discourage cooperation between companies.

DISCUSSION

Many factors influence the distribution of research costs between public and private sources. Publicly funded research may promote broad social goals, but may also be defended in economic terms. Some of the preceding reasons were briefly summarized in a recent report by the U.S. Office of Technology Assessment (1983):

"Public agencies venture into development areas where broad social gains may be realized and the development is long-term, high risk, and unlikely

to attract private research investment. Sometimes public agencies undertake applied R & D when the commercial sector consists of small enterprises without technical and funding capacity, or when R & D will benefit 'public goods' such as wildlife or recreation."

The new knowledge created in many areas of basic and applied forestry research can also be considered a public good. Results from forestry research are often not entirely appropriable, and private-sector research by even the largest, most diversified forestry firms lags behind private-sector funds in other industries.

While public support for specific research may be rational, funds are not justified for economic reasons unless they generate acceptable returns. Agricultural researchers in the U.S. have in many cases successfully defended public research efforts by estimating marginal and average rates of return for aggregated investments. Forestry research evaluations are also being conducted in the U.S., however (Hyde, 1983; Bengston, 1984; U.S. Forest Service, 1985). Such studies become increasingly important with growing competition for public funds.

Public support is appropriate in many areas of basic and applied research and development. In defending such efforts in forestry, socio-political factors, economic structure and the characteristics of expected benefits should be considered. Public support is essential if forestry research is to continue improving the worldwide management and wise use of a vital, renewable natural resource.

ACKNOWLEDGEMENTS

The author wishes to thank reviewers of the manuscript, with special thanks to Dr. Thomas Ellis, Southern Forest Experiment Station, for helpful comments on an earlier version.

REFERENCES

- Bengston, D.N., 1984. Economic impacts of structural particleboard research. *For. Sci.*, 30(3): 685-697.
- De Steiguer, J.E. and Massey, J.G., 1981. Forestry research priorities of various user groups. *For. Prod. J.*, 31(10): 86-88.
- Duncan, D.P., 1979. Potential problems facing university research in forestry and forest products. *For. Prod. J.*, 29(4): 14-17.
- Hyde, W.F. (Editor), 1983. *Economic Evaluation of Investments in Forestry Research*. Acorn Press, Durham, NC.
- Keyworth, G.A. II., 1984. Four years of Reagan science policy: notable shifts in priorities. *Science*, 224(4644): 9-13.
- National Science Foundation, 1981. *The 5-year outlook on science and technology*. Washington, DC.

- National Science Foundation, 1983. *Research and development in industry, 1981*. Washington, DC, NSF 83-325.
- Office of Technology Assessment, 1983. *Wood use, U.S. competitiveness and technology*. OTA-ITE-210.
- Purcell, J.C., 1981. A rationale for a publicly supported nationwide system of agriculture and food research. *Feedstuffs*, 53(24): 30, 32, 34-36.
- Rausser, G.C., de Janvry, A., Schmitz, A., and Zilberman, D., 1981. Principal issues in the evaluation of public research in agriculture. In: *Proc. Workshop on Evaluation of Agricultural Research*. Minn. Agric. Exp. Stn., Misc. Publ. 8-1981, pp. 262-282.
- Runge, C.F., 1983. Balancing public and private sector forestry research: rationale and plan of study. In: W.F. Hyde (Editor), *Economic Investments in Forestry Research*. Acorn Press, Durham, NC, pp. 68-85.
- Tombaugh, L.W., 1981. Research and development in the forest products industry. Paper presented at the 1981 AFI — Deans Tour, 13 pp.
- U.S. Forest Service, 1981. *Criteria for deciding about forestry research programs*. U.S. For. Serv. Gen. Tech. Rep. WO-29, 52 pp.
- U.S. Forest Service, 1985. *Forestry research evaluation: current progress, future directions*. U.S. For. Serv. Northcentral For. Exp. Stn. Gen. Tech. Rep. NC-104, 140 pp.
- White, F.C., Eddleman, B.R. and Purcell, J.C., 1980. Nature and flow of benefits from ag-food research. *IR-6 Info. Rep. No. 5*, 63 pp.
- Wilson, G.W., 1971. Some notes on the economics of diffusion (appendix). In: G.W. Wilson (Editor), *Technological Development and Economic Growth*. Bus. Pap. 18, School of Business, Indiana Univ., pp. 161-177.
- Youngs, R.L., 1983. Forest Service research — new views of an old mission. *For. Prod. J.*, 33(11/12): 15-18.